Measuring Broadband America Program

Working in open collaboration, to build a transparent measurement collection and reporting methodology, and to publish a freely available dataset of US consumer broadband performance, since 2010.

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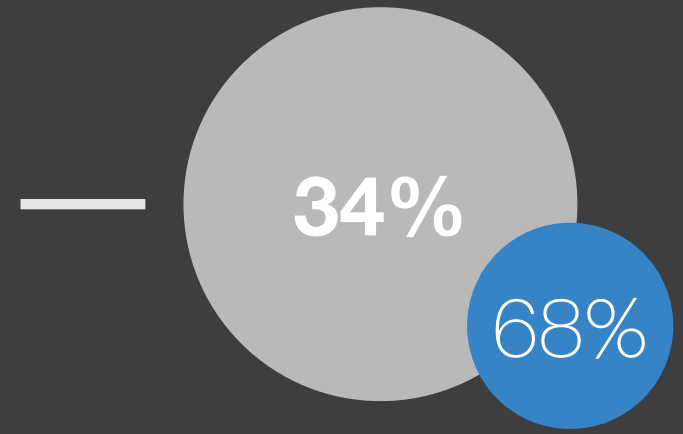
YouTube Measurements

In ReQuest®, a quarterly study into the telecommunication behavior of over 20,000 U.S. households, TNS found that more than one-third (34%) of households have streamed video within the previous month

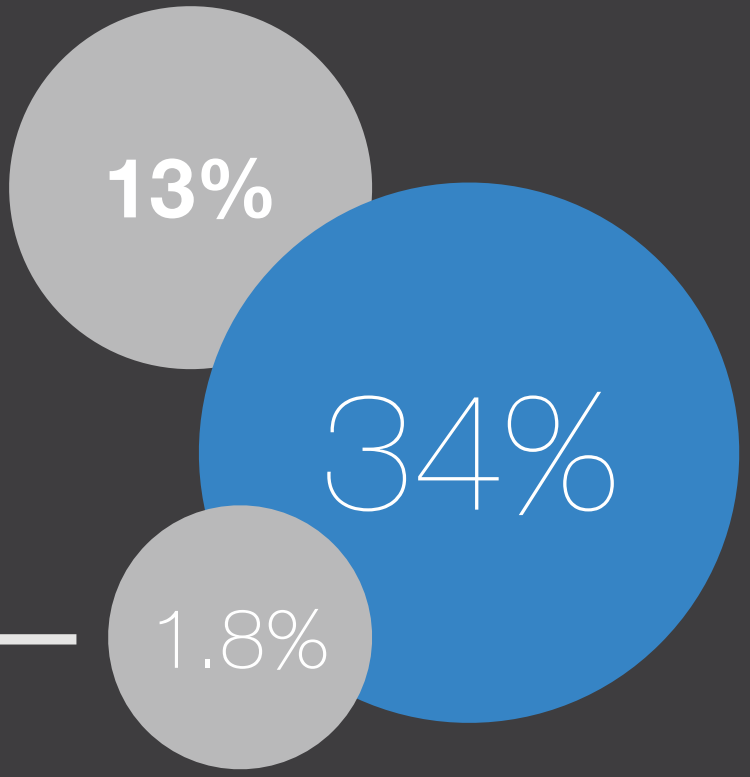
http://www.bloomberg.com/article/2014-07-23/a1ojcvnvwHIM.html



According to the Wowza survey, conducted at the NAB Show 2014 in Las Vegas, 68 percent of respondents use 4 or more devices a day and expect access to high-quality video streaming experiences on any device

http://www.wowza.com/news/survey-reveals-growing-streaming-demand

YouTube second heaviest source of peak download traffic.



Netflix traffic accounted for 34% of North America's downloads during the busiest hours of the day this year.

Amazon's share of peak downstream traffic.

Source: http://online.wsj.com/news/articles/SB10001424052702304908304579561802483718502

Test Overview

- ✓ Measures streaming rate of YouTube videos
- ✓ Uses most popular YouTube videos and real YouTube content servers
- ✓ Rate adapts down when a stall occurs
- ✓ Supports MPEG4, WebM, DASH, FLV, 3GPP
- ✓ Developed in conjunction with Aalto University (Finland)

Test Process

1. Fetch list of most popular videos in the US that are 60+ secs long from YouTube API
2. Fetch YouTube web page for this video, find all video formats and content server (same one a real end user would use).
3. Select the bitrate that is closest to (<=) the user's fastest download speedtest result.
4. Start downloading the video. Prebuffer two seconds worth of content.
5. Parse frame headers on the fly (contains frame timestamp); if frame timestamp falls behind playback time, then we have a stall event.
6. (Optional) Upon a stall, retry the test at next lowest video rate

Test Outputs

- Timestamp
- YouTube video ID
- YouTube server hostname, IP address and IP version
- Video codec
- Test duration (how long we ran for in realtime)
- Downloaded video duration (how many seconds of video we got)
- Stalls: number of events, total duration, average duration
- Download speed (not terribly useful, YouTube rate-limit this)
- Video bitrate, audio bitrate
- TCP connect times (3-way handshake) for video & audio channels

Proposed Metric
Average Bitrate Reliably Streamed

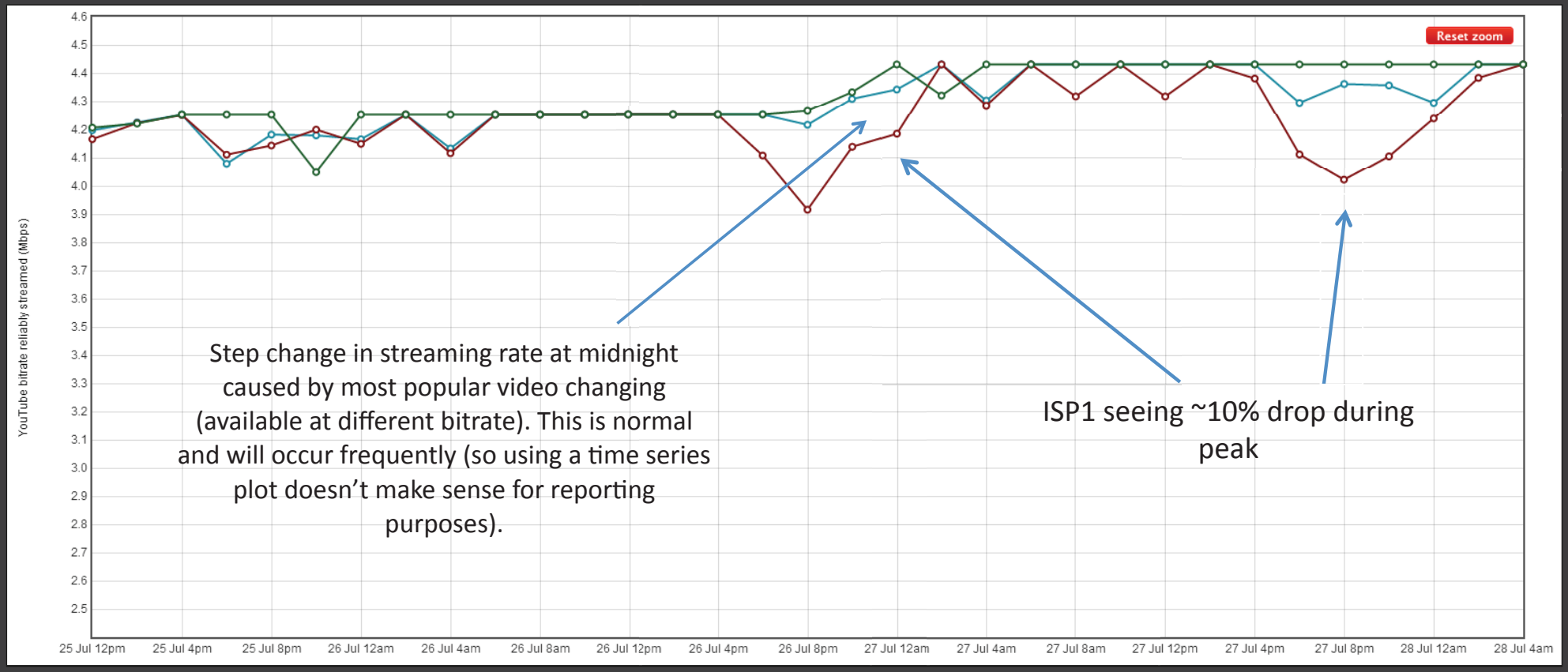
Test process:

- Run the test as described earlier, stepping down to the next lowest bitrate if a stall occurs
- When stalls no longer occur, that bitrate is the probe's "bitrate reliably streamed" for that hour
- If we exhaust all bitrate options then the bitrate reliably streamed = 0 for that hour

Analysis:

- Sum video and audio bitrates for the only successful test each hour (on the final test attempt, we will record a success even if stalls occur)
- Changes in most popular YouTube video will bring about step changes in bitrate (not all videos are encoded equally), but this will affect all ISPs equally. Nonetheless, examining over a week or month would be advisable (to smooth this out)

Very Preliminary Example



***RED = ISP1, BLUE = ISP2, GREEN = ISP3**
***Each ISP has ~30 probes running the test every hour**